

REMARKS

Favorable reconsideration is respectfully requested.

The claims are 1 to 10.

The above amendment is responsive to points set forth in the Official Action as will be discussed below.

Claims 1 to 8 have been rejected on the ground of obviousness-type double patenting over claims 1 to 8 of co-pending application Serial No. 09/937,725.

In reply, there is submitted herewith a Terminal Disclaimer which disclaims the terminal portion of any patent maturing from the present application which extends beyond the expiration date of the co-pending application.

Claims 1 to 4, 6 and 7 have been rejected under 35 USC 102(b) as being anticipated by Baron et al.

This rejection is respectfully traversed.

Barton discloses an oxidation, which proceeds through cerium (not cesium) mediated singlet oxygen formation from hydrogen peroxide, since cerium(IV)oxide is used in more than stoichiometric amounts. Further Barton uses an heterogenous catalyst, which is no longer being claimed.

The process claimed herein deals with catalytic methods for performing singlet oxygenations based on hydrogen peroxide (see page 6: The amount of catalyst used ...).

Furthermore Barton teaches that the optimum temperature for this oxidation reaction is 60-70°C (see page 1612, left column, 2nd paragraph), whereas according to the present invention the reaction temperature is between 0 and 50°C (claim 7), preferably 15 to 35°C (claim 11). Basis is page 6, lines 31 and 32.

Therefore the process according to the present invention is novel and unobvious from Barton.

Claims 1, 2 and 5 to 7 have been rejected under 35 USC 102(b) as anticipated by Van Laar et al.

This rejection is also respectfully traversed.

Van Laar deals with the generation of singlet oxygen from hydrogen peroxide catalyzed by immobilized molybdate, using a layered double hydroxide (LDH) support.

Such immobilized catalysts are no longer claimed since the present invention uses homogeneous catalysts, e.g. simple metal salts (see examples).

In fact, Van Laar supports the inventive nature of the presently claimed process, because Van Laar clearly demonstrates both on page 267 (...in solution, the same processes would require additional NaOH), as well as on page 268 (A soluble base, as required for the homogeneous molybdate system, ...) that it is generally believed that homogeneously catalyzed singlet oxygen formation with molybdate catalysts requires the presence of soluble, aqueous NaOH as the base. According to the present invention, however, addition of base is not necessarily required (no base is added in the experimental examples described in the present application), and the fact that no aqueous base is required for this homogeneously catalyzed oxidation based on molybdate is clearly unexpected in view of the common belief expressed by both foregoing citations on pages 267 and 268 from Van Laar.

Such base is included by "consisting essentially of" terminology in claims 9 and 10.

Therefore the process as presently claimed is also novel and unobvious in view of Van Laar.

Claims 1 to 8 have been rejected under 35 USC 103(a) as being unpatentable over Barton et al. in view of Aubry (1985).

This rejection is respectfully traversed.

Aubry (1985) discloses a singlet oxygen oxidation in an aqueous basic solution.

According to Aubry (1985), however, addition of base is not necessarily required (no base is added in the experimental examples described in the present application), and the fact that no aqueous base is required for this homogeneously catalyzed oxidation based on molybdate is clearly unexpected in view of the common belief expressed by both foregoing citations on pages 267 and 268 from Van Laar.

Two additional references are provided on page 2 of the present specification which, in addition to Van Laar, clearly demonstrate that it was commonly believed that the singlet oxygen

generation from hydrogen peroxide by (soluble) molybdate requires the presence of an aqueous medium. These two references are Membrane Lipid Oxid. Vol. II, 1991, p. 65 and J. Am. Chem. Soc. 1997, 119, p. 5286. In addition, this common belief is expressed in The Analyst, 2000, 125, p. 2075.

As is evident from Membrane Lipid Oxid. Vol. II, 1991, p. 65 (also cited on page 2 of the present specification) the molybdate catalyzed singlet oxygenation of hydrophobic organic compounds is difficult, because none of the common organic solvents is able to sustain the molybdate catalyzed formation of singlet oxygen from hydrogen peroxide; see page 84 of this article: "The oxidation of hydrophobic substrates is more difficult since none of the common organic solvents can sustain this disproportionation. However, satisfactory results were obtained in a mixed solvent of methanol-water, 70/30, which permits....". Therefore, prior to the present invention, a mixture of a water-soluble organic solvent and water was used in order to perform the oxidation of water insoluble substrates. Because such a mixture results, however, in modest yields (as made clear on page 2 of the present application), complex micro-emulsion systems were developed in order to increase the yield of the molybdate catalyzed singlet oxygenation of lipophilic substrates. These micro-emulsion systems are described in J. Am. Chem. Soc. 1997, 119, p. 5286, which once more explicitly states that the scope of the molybdate catalyzed singlet oxygenation in organic solvent/water mixtures is restricted to hydrophilic compounds or hydrophobic compounds with low molecular weight: "This reaction proceeds efficiently only in pure water and in aqueous MeOH or EtOH. Therefore, only organic substrates with some hydrophilicity and/or of low molecular weight can be oxidized on the preparative scale with this system".

In view of the foregoing, it is clearly surprising that such catalytic singlet oxygenations based on hydrogen peroxide can be carried out using pure organic solvents or organic solvents containing only small amounts of water.

Moreover, the present application, pages 6 and 7 (see also claims 8 and 10) also describes another unexpected aspect of the present invention, i.e. the fact that the Na_2MoO_4 catalyst, which

dissolves in the presence of H₂O₂, can be easily recovered by filtration after the reaction because it precipitates from the solution at the end of the reaction.

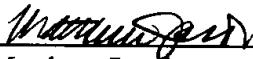
Since neither Barton nor the Aubry (1985) reference disclose or suggest that the singlet oxygen oxidation could be performed with homogenous catalysts without the need for an aqueous base and in pure organic solvents, but teach the necessity of the presence of water and base, the presently claimed process is novel as well as unobvious in view of Barton and the Aubry (1985) references.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

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